

Abstract

An apparatus and process for solvent pulping of cellulose-containing biomass utilizes at least one steaming vessel, a plug screw feeder or compression screw device, at least one super-atmospheric impregnation vessel, a solvent delignification reactor capable of operating at a pressure of 350 psig or more, and a solvent containing line for introducing solvent-containing liquor at the plug screw feeder outlet or compression screw device outlet. The process and system can also include at least one series connected pressure diffuser and optionally a retention tube downstream of each pressure diffuser to provide sufficient retention time to substantially preclude re-deposition of lignin on the cellulose fibers of the biomass, a blow tank connected to the last of the pressure diffusers and retention tubes, and vessels for multistage alcohol washing. The method steams the biomass and impregnates it with solvent to produce an aqueous slurry of biomass and solvent, delignifies the particulate biomass in the slurry, removes solvent while continuing delignification of the biomass in the slurry and while substantially precluding re-deposition of lignin on the cellulose of the biomass, reduces the pressure of the slurry; and then washes the slurry.